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<110> Barenkamp, Stephen J.

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<151> 1998-09-30

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 Thr Phe Asn Lys Ala Thr Phe Asn Ile Ala Gln Gly Ser Thr Ala Asn
 705 710 715 720
 Phe Ser Ile Lys Ala Ser Ile Met Pro Phe Lys Ser Asn Ala Asn Tyr
 725 730 735
 Ala Leu Phe Asn Glu Asp Ile Ser Val Ser Gly Gly Gly Ser Val Asn
 740 745 750
 Phe Lys Leu Asn Ala Ser Ser Ser Asn Ile Gln Thr Pro Gly Val Ile
 755 760 765
 Ile Lys Ser Gln Asn Phe Asn Val Ser Gly Gly Ser Thr Leu Asn Leu
 770 775 780
 Lys Ala Glu Gly Ser Thr Glu Thr Ala Phe Ser Ile Glu Asn Asp Leu
 785 790 795 800
 Asn Leu Asn Ala Thr Gly Gly Asn Ile Thr Ile Arg Gln Val Glu Gly
 805 810 815
 Thr Asp Ser Arg Val Asn Lys Gly Val Ala Ala Lys Lys Asn Ile Thr
 820 825 830
 Phe Lys Gly Gly Asn Ile Thr Phe Gly Ser Gln Lys Ala Thr Thr Glu
 835 840 845
 Ile Lys Gly Asn Val Thr Ile Asn Lys Asn Thr Asn Ala Thr Leu Arg
 850 855 860
 Gly Ala Asn Phe Ala Glu Asn Lys Ser Pro Leu Asn Ile Ala Gly Asn
 865 870 875 880
 Val Ile Asn Asn Gly Asn Leu Thr Thr Ala Gly Ser Ile Ile Asn Ile
 885 890 895

Ala Gly Asn Leu Thr Val Ser Lys Gly Ala Asn Leu Gln Ala Ile Thr
 900 905 910
 Asn Tyr Thr Phe Asn Val Ala Gly Ser Phe Asp Asn Asn Gly Ala Ser
 915 920 925
 Asn Ile Ser Ile Ala Arg Gly Gly Ala Lys Phe Lys Asp Ile Asn Asn
 930 935 940
 Thr Ser Ser Leu Asn Ile Thr Thr Asn Ser Asp Thr Thr Tyr Arg Thr
 945 950 955 960
 Ile Ile Lys Gly Asn Ile Ser Asn Lys Ser Gly Asp Leu Asn Ile Ile
 965 970 975
 Asp Lys Lys Ser Asp Ala Glu Ile Gln Ile Gly Gly Asn Ile Ser Gln
 980 985 990
 Lys Glu Gly Asn Leu Thr Ile Ser Ser Asp Lys Val Asn Ile Thr Asn
 995 1000 1005
 Gln Ile Thr Ile Lys Ala Gly Val Glu Gly Gly Arg Ser Asp Ser Ser
 1010 1015 1020
 Glu Ala Glu Asn Ala Asn Leu Thr Ile Gln Thr Lys Glu Leu Lys Leu
 1025 1030 1035 1040
 Ala Gly Asp Leu Asn Ile Ser Gly Phe Asn Lys Ala Glu Ile Thr Ala
 1045 1050 1055
 Lys Asn Gly Ser Asp Leu Thr Ile Gly Asn Ala Ser Gly Gly Asn Ala
 1060 1065 1070
 Asp Ala Lys Lys Val Thr Phe Asp Lys Val Lys Asp Ser Lys Ile Ser
 1075 1080 1085
 Thr Asp Gly His Asn Val Thr Leu Asn Ser Glu Val Lys Thr Ser Asn
 1090 1095 1100
 Gly Ser Ser Asn Ala Gly Asn Asp Asn Ser Thr Gly Leu Thr Ile Ser
 1105 1110 1115 1120
 Ala Lys Asp Val Thr Val Asn Asn Asn Val Thr Ser His Lys Thr Ile
 1125 1130 1135
 Asn Ile Ser Ala Ala Ala Gly Asn Val Thr Thr Lys Glu Gly Thr Thr
 1140 1145 1150
 Ile Asn Ala Thr Thr Gly Ser Val Glu Val Thr Ala Gln Asn Gly Thr
 1155 1160 1165
 Ile Lys Gly Asn Ile Thr Ser Gln Asn Val Thr Val Thr Ala Thr Glu
 1170 1175 1180
 Asn Leu Val Thr Thr Glu Asn Ala Val Ile Asn Ala Thr Ser Gly Thr
 1185 1190 1195 1200
 Val Asn Ile Ser Thr Lys Thr Gly Asp Ile Lys Gly Gly Ile Glu Ser
 1205 1210 1215

Thr Ser Gly Asn Val Asn Ile Thr Ala Ser Gly Asn Thr Leu Lys Val
 1220 1225 1230
 Ser Asn Ile Thr Gly Gln Asp Val Thr Val Thr Ala Asp Ala Gly Ala
 1235 1240 1245
 Leu Thr Thr Thr Ala Gly Ser Thr Ile Ser Ala Thr Thr Gly Asn Ala
 1250 1255 1260
 Asn Ile Thr Thr Lys Thr Gly Asp Ile Asn Gly Lys Val Glu Ser Ser
 1265 1270 1275 1280
 Ser Gly Ser Val Thr Leu Val Ala Thr Gly Ala Thr Leu Ala Val Gly
 1285 1290 1295
 Asn Ile Ser Gly Asn Thr Val Thr Ile Thr Ala Asp Ser Gly Lys Leu
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 Thr Ser Thr Val Gly Ser Thr Ile Asn Gly Thr Asn Ser Val Thr Thr
 1315 1320 1325
 Ser Ser Gln Ser Gly Asp Ile Glu Gly Thr Ile Ser Gly Asn Thr Val
 1330 1335 1340
 Asn Val Thr Ala Ser Thr Gly Asp Leu Thr Ile Gly Asn Ser Ala Lys
 1345 1350 1355 1360
 Val Glu Ala Lys Asn Gly Ala Ala Thr Leu Thr Ala Glu Ser Gly Lys
 1365 1370 1375
 Leu Thr Thr Gln Thr Gly Ser Ser Ile Thr Ser Ser Asn Gly Gln Thr
 1380 1385 1390
 Thr Leu Thr Ala Lys Asp Ser Ser Ile Ala Gly Asn Ile Asn Ala Ala
 1395 1400 1405
 Asn Val Thr Leu Asn Thr Thr Gly Thr Leu Thr Thr Thr Gly Asp Ser
 1410 1415 1420
 Lys Ile Asn Ala Thr Ser Gly Thr Leu Thr Ile Asn Ala Lys Asp Ala
 1425 1430 1435 1440
 Lys Leu Asp Gly Ala Ala Ser Gly Asp Arg Thr Val Val Asn Ala Thr
 1445 1450 1455
 Asn Ala Ser Gly Ser Gly Asn Val Thr Ala Lys Thr Ser Ser Ser Val
 1460 1465 1470
 Asn Ile Thr Gly Asp Leu Asn Thr Ile Asn Gly Leu Asn Ile Ile Ser
 1475 1480 1485
 Glu Asn Gly Arg Asn Thr Val Arg Leu Arg Gly Lys Glu Ile Asp Val
 1490 1495 1500
 Lys Tyr Ile Gln Pro Gly Val Ala Ser Val Glu Glu Val Ile Glu Ala
 1505 1510 1515 1520

Lys Arg Val Leu Glu Lys Val Lys Asp Leu Ser Asp Glu Glu Arg Glu
 1525 1530 1535
 Thr Leu Ala Lys Leu Gly Val Ser Ala Val Arg Phe Val Glu Pro Asn
 1540 1545 1550
 Asn Ala Ile Thr Val Asn Thr Gln Asn Glu Phe Thr Thr Lys Pro Ser
 1555 1560 1565
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 1570 1575 1580
 Gly Ala Arg Val Cys Thr Asn Val Ala Asp Asp Gly Gln Gln Pro
 1585 1590 1595

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 <212> PRT
 <213> Haemophilus influenzae

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 Val Ala Val Ser Glu Leu Thr Arg Gly Cys Asp His Ser Thr Glu Lys
 20 25 30
 Gly Ser Glu Lys Pro Val Arg Thr Lys Val Arg His Leu Ala Leu Lys
 35 40 45
 Pro Leu Ser Ala Ile Leu Leu Ser Leu Gly Met Ala Ser Ile Pro Gln
 50 55 60
 Ser Val Leu Ala Ser Gly Leu Gln Gly Met Ser Val Val His Gly Thr
 65 70 75 80
 Ala Thr Met Gln Val Asp Gly Asn Lys Thr Thr Ile Arg Asn Ser Val
 85 90 95
 Asn Ala Ile Ile Asn Trp Lys Gln Phe Asn Ile Asp Gln Asn Glu Met
 100 105 110
 Glu Gln Phe Leu Gln Glu Ser Ser Asn Ser Ala Val Phe Asn Arg Val
 115 120 125
 Thr Ser Asp Gln Ile Ser Gln Leu Lys Gly Ile Leu Asp Ser Asn Gly
 130 135 140
 Gln Val Phe Leu Ile Asn Pro Asn Gly Ile Thr Ile Gly Lys Asp Ala
 145 150 155 160
 Ile Ile Asn Thr Asn Gly Phe Thr Ala Ser Thr Leu Asp Ile Ser Asn
 165 170 175
 Glu Asn Ile Lys Ala Arg Asn Phe Thr Leu Glu Gln Thr Lys Asp Lys
 180 185 190

Ala Leu Ala Glu Ile Val Asn His Gly Leu Ile Thr Val Gly Lys Asp
 195 200 205
 Gly Ser Val Asn Leu Ile Gly Gly Lys Val Lys Asn Glu Gly Val Ile
 210 215 220
 Ser Val Asn Gly Gly Ser Ile Ser Leu Leu Ala Gly Gln Lys Ile Thr
 225 230 235 240
 Ile Ser Asp Ile Ile Asn Pro Thr Ile Thr Tyr Ser Ile Ala Ala Pro
 245 250 255
 Glu Asn Glu Ala Ile Asn Leu Gly Asp Ile Phe Ala Lys Gly Gly Asn
 260 265 270
 Ile Asn Val Arg Ala Ala Thr Ile Arg Asn Lys Gly Lys Leu Ser Ala
 275 280 285
 Asp Ser Val Ser Lys Asp Lys Ser Gly Asn Ile Val Leu Ser Ala Lys
 290 295 300
 Glu Gly Glu Ala Glu Ile Gly Gly Val Ile Ser Ala Gln Asn Gln Gln
 305 310 315 320
 Ala Lys Gly Gly Lys Leu Met Ile Thr Gly Asp Lys Val Thr Leu Lys
 325 330 335
 Thr Gly Ala Val Ile Asp Leu Ser Gly Lys Glu Gly Gly Glu Thr Tyr
 340 345 350
 Leu Gly Gly Asp Glu Arg Gly Glu Gly Lys Asn Gly Ile Gln Leu Ala
 355 360 365
 Lys Lys Thr Thr Leu Glu Lys Gly Ser Thr Ile Asn Val Ser Gly Lys
 370 375 380
 Glu Lys Gly Gly Arg Ala Ile Val Trp Gly Asp Ile Ala Leu Ile Asp
 385 390 395 400
 Gly Asn Ile Asn Ala Gln Gly Ser Asp Ile Ala Lys Thr Gly Gly Phe
 405 410 415
 Val Glu Thr Ser Gly His Asp Leu Ser Ile Gly Asp Asp Val Ile Val
 420 425 430
 Asp Ala Lys Glu Trp Leu Leu Asp Pro Asp Asp Val Ser Ile Glu Thr
 435 440 445
 Leu Thr Ser Gly Arg Asn Asn Thr Gly Glu Asn Gln Gly Tyr Thr Thr
 450 455 460
 Gly Asp Gly Thr Lys Glu Ser Pro Lys Gly Asn Ser Ile Ser Lys Pro
 465 470 475 480
 Thr Leu Thr Asn Ser Thr Leu Glu Gln Ile Leu Arg Arg Gly Ser Tyr
 485 490 495
 Val Asn Ile Thr Ala Asn Asn Arg Ile Tyr Val Asn Ser Ser Ile Asn
 500 505 510

Leu Ser Asn Gly Ser Leu Thr Leu His Thr Lys Arg Asp Gly Val Lys
 515 520 525
 Ile Asn Gly Asp Ile Thr Ser Asn Glu Asn Gly Asn Leu Thr Ile Lys
 530 535 540
 Ala Gly Ser Trp Val Asp Val His Lys Asn Ile Thr Leu Gly Thr Gly
 545 550 555 560
 Phe Leu Asn Ile Val Ala Gly Asp Ser Val Ala Phe Glu Arg Glu Gly
 565 570 575
 Asp Lys Ala Arg Asn Ala Thr Asp Ala Gln Ile Thr Ala Gln Gly Thr
 580 585 590
 Ile Thr Val Asn Lys Asp Asp Lys Gln Phe Arg Phe Asn Asn Val Ser
 595 600 605
 Leu Asn Gly Thr Gly Lys Gly Leu Lys Phe Ile Ala Asn Gln Asn Asn
 610 615 620
 Phe Thr His Lys Phe Asp Gly Glu Ile Asn Ile Ser Gly Ile Val Thr
 625 630 635 640
 Ile Asn Gln Thr Thr Lys Lys Asp Val Lys Tyr Trp Asn Ala Ser Lys
 645 650 655
 Asp Ser Tyr Trp Asn Val Ser Ser Leu Thr Leu Asn Thr Val Gln Lys
 660 665 670
 Phe Thr Phe Ile Lys Phe Val Asp Ser Gly Ser Asn Gly Gln Asp Leu
 675 680 685
 Arg Ser Ser Arg Arg Ser Phe Ala Gly Val His Phe Asn Gly Ile Gly
 690 695 700
 Gly Lys Thr Asn Phe Asn Ile Gly Ala Asn Ala Lys Ala Leu Phe Lys
 705 710 715 720
 Leu Lys Pro Asn Ala Ala Thr Asp Pro Lys Lys Glu Leu Pro Ile Thr
 725 730 735
 Phe Asn Ala Asn Ile Thr Ala Thr Gly Asn Ser Asp Ser Ser Val Met
 740 745 750
 Phe Asp Ile His Ala Asn Leu Thr Ser Arg Ala Ala Gly Ile Asn Met
 755 760 765
 Asp Ser Ile Asn Ile Thr Gly Gly Leu Asp Phe Ser Ile Thr Ser His
 770 775 780
 Asn Arg Asn Ser Asn Ala Phe Glu Ile Lys Lys Asp Leu Thr Ile Asn
 785 790 795 800
 Ala Thr Gly Ser Asn Phe Ser Leu Lys Gln Thr Lys Asp Ser Phe Tyr
 805 810 815

Asn Glu Tyr Ser Lys His Ala Ile Asn Ser Ser His Asn Leu Thr Ile
 820 825 830
 Leu Gly Gly Asn Val Thr Leu Gly Gly Glu Asn Ser Ser Ser Ser Ile
 835 840 845
 Thr Gly Asn Ile Asn Ile Thr Asn Lys Ala Asn Val Thr Leu Gln Ala
 850 855 860
 Asp Thr Ser Asn Ser Asn Thr Gly Leu Lys Lys Arg Thr Leu Thr Leu
 865 870 875 880
 Gly Asn Ile Ser Val Glu Gly Asn Leu Ser Leu Thr Gly Ala Asn Ala
 885 890 895
 Asn Ile Val Gly Asn Leu Ser Ile Ala Glu Asp Ser Thr Phe Lys Gly
 900 905 910
 Glu Ala Ser Asp Asn Leu Asn Ile Thr Gly Thr Phe Thr Asn Asn Gly
 915 920 925
 Thr Ala Asn Ile Asn Ile Lys Gly Val Val Lys Leu Gly Asp Ile Asn
 930 935 940
 Asn Lys Gly Gly Leu Asn Ile Thr Thr Asn Ala Ser Gly Thr Gln Lys
 945 950 955 960
 Thr Ile Ile Asn Gly Asn Ile Thr Asn Glu Lys Gly Asp Leu Asn Ile
 965 970 975
 Lys Asn Ile Lys Ala Asp Ala Glu Ile Gln Ile Gly Gly Asn Ile Ser
 980 985 990
 Gln Lys Glu Gly Asn Leu Thr Ile Ser Ser Asp Lys Val Asn Ile Thr
 995 1000 1005
 Asn Gln Ile Thr Ile Lys Ala Gly Val Glu Gly Gly Arg Ser Asp Ser
 1010 1015 1020
 Ser Glu Ala Glu Asn Ala Asn Leu Thr Ile Gln Thr Lys Glu Leu Lys
 1025 1030 1035 1040
 Leu Ala Gly Asp Leu Asn Ile Ser Gly Phe Asn Lys Ala Glu Ile Thr
 1045 1050 1055
 Ala Lys Asn Gly Ser Asp Leu Thr Ile Gly Asn Ala Ser Gly Gly Asn
 1060 1065 1070
 Ala Asp Ala Lys Lys Val Thr Phe Asp Lys Val Lys Asp Ser Lys Ile
 1075 1080 1085
 Ser Thr Asp Gly His Asn Val Thr Leu Asn Ser Glu Val Lys Thr Ser
 1090 1095 1100
 Asn Gly Ser Ser Asn Ala Gly Asn Asp Asn Ser Thr Gly Leu Thr Ile
 1105 1110 1115 1120
 Ser Ala Lys Asp Val Thr Val Asn Asn Asn Val Thr Ser His Lys Thr
 1125 1130 1135

Ile Asn Ile Ser Ala Ala Ala Gly Asn Val Thr Thr Lys Glu Gly Thr
 1140 1145 1150
 Thr Ile Asn Ala Thr Thr Gly Ser Val Glu Val Thr Ala Gln Asn Gly
 1155 1160 1165
 Thr Ile Lys Gly Asn Ile Thr Ser Gln Asn Val Thr Val Thr Ala Thr
 1170 1175 1180
 Glu Asn Leu Val Thr Thr Glu Asn Ala Val Ile Asn Ala Thr Ser Gly
 1185 1190 1195 1200
 Thr Val Asn Ile Ser Thr Lys Thr Gly Asp Ile Lys Gly Gly Ile Glu
 1205 1210 1215
 Ser Thr Ser Gly Asn Val Asn Ile Thr Ala Ser Gly Asn Thr Leu Lys
 1220 1225 1230
 Val Ser Asn Ile Thr Gly Gln Asp Val Thr Val Thr Ala Asp Ala Gly
 1235 1240 1245
 Ala Leu Thr Thr Thr Ala Gly Ser Thr Ile Ser Ala Thr Thr Gly Asn
 1250 1255 1260
 Ala Asn Ile Thr Thr Lys Thr Gly Asp Ile Asn Gly Lys Val Glu Ser
 1265 1270 1275 1280
 Ser Ser Gly Ser Val Thr Leu Val Ala Thr Gly Ala Thr Leu Ala Val
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 Gly Asn Ile Ser Gly Asn Thr Val Thr Ile Thr Ala Asp Ser Gly Lys
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 Leu Thr Ser Thr Val Gly Ser Thr Ile Asn Gly Thr Asn Ser Val Thr
 1315 1320 1325
 Thr Ser Ser Gln Ser Gly Asp Ile Glu Gly Thr Ile Ser Gly Asn Thr
 1330 1335 1340
 Val Asn Val Thr Ala Ser Thr Gly Asp Leu Thr Ile Gly Asn Ser Ala
 1345 1350 1355 1360
 Lys Val Glu Ala Lys Asn Gly Ala Ala Thr Leu Thr Ala Glu Ser Gly
 1365 1370 1375
 Lys Leu Thr Thr Gln Thr Gly Ser Ser Ile Thr Ser Ser Asn Gly Gln
 1380 1385 1390
 Thr Thr Leu Thr Ala Lys Asp Ser Ser Ile Ala Gly Asn Ile Asn Ala
 1395 1400 1405
 Ala Asn Val Thr Leu Asn Thr Thr Gly Thr Leu Thr Thr Thr Gly Asp
 1410 1415 1420
 Ser Lys Ile Asn Ala Thr Ser Gly Thr Leu Thr Ile Asn Ala Lys Asp
 1425 1430 1435 1440

Ala Lys Leu Asp Gly Ala Ala Ser Gly Asp Arg Thr Val Val Asn Ala
 1445 1450 1455

Thr Asn Ala Ser Gly Ser Gly Asn Val Thr Ala Lys Thr Ser Ser Ser
 1460 1465 1470

Val Asn Ile Thr Gly Asp Leu Asn Thr Ile Asn Gly Leu Asn Ile Ile
 1475 1480 1485

Ser Glu Asn Gly Arg Asn Thr Val Arg Leu Arg Gly Lys Glu Ile Asp
 1490 1495 1500

Val Lys Tyr Ile Gln Pro Gly Val Ala Ser Val Glu Glu Val Ile Glu
 1505 1510 1515 1520

Ala Lys Arg Val Leu Glu Lys Val Lys Asp Leu Ser Asp Glu Glu Arg
 1525 1530 1535

Glu Thr Leu Ala Lys Leu Gly Val Ser Ala Val Arg Phe Val Glu Pro
 1540 1545 1550

Asn Asn Ala Ile Thr Val Asn Thr Gln Asn Glu Phe Thr Thr Lys Pro
 1555 1560 1565

Ser Ser Gln Val Thr Ile Ser Glu Gly Lys Ala Cys Phe Ser Ser Gly
 1570 1575 1580

Asn Gly Ala Arg Val Cys Thr Asn Val Ala Asp Asp Gly Gln Gln Pro
 1585 1590 1595 1600

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